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Abstract

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Keywords

Cattlemen's Day, 1981; Report of progress (Kansas State University. Agricultural Experiment Station); 394; Beef; Electrical stimulation; pH; Hot-boned

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Continuous Versus Intermittent Electrical Stimulation of Beef Carcasses and Their Effect on Hot-boned Muscle-pH Decline

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Summary

Short bursts of electricity (intermittent electrical stimulation) to beef carcasses accelerated pH decline and the onset of rigor mortis more than continuous stimulation did.

Introduction

Boning beef carcasses while they are still warm leads to large savings in power and cooler space. "Hot boning" processes and its advantages were discussed in the 1980 Cattlemen's Day publication. However, when a muscle undergoes rigor after being hot boned, it can become less tender. Rigor occurs because the muscle's chemical energy supply (glycogen) is converted to lactic acid, which causes the pH to drop, and rigor to occur. Using electrical stimulation to contract carcass muscles speeds up glycogen conversion to lactic acid, the subsequent pH drop, and rigor. Then, the carcass can be hot boned without decreasing tenderness.

The optimum combination of electrical stimulation (continuous or intermittent shock, voltage, postmortem stimulation time, duration of stimulation, amperage and frequencies) required for the fastest rigor onset has not been determined, so that is what we hoped to determine.

Experimental Procedure

Two groups of crossbred steers were slaughtered, electrically stimulated and hot boned. In group I, 46 sides were stimulated 1 hour postmortem with 400 volts of continuous, 60 cycle, alternating current for 2 minutes. Approximately .6 amp was delivered through the carcass. Two hours after slaughter the strip loin was hot boned. PH was monitored on the strip loin longissimus muscle.

In group II, 24 sides were electrically stimulated for 2 minutes at 45 minutes postmortem, using the same current characteristics except the current was pulsed, 1.6 second "on" and 0.8 second "off."

Results and Discussion

Both continuous and intermittent ES accelerated postmortem pH decline, but intermittent stimulation decreased the muscle pH slightly faster. Intermittent stimulation at 45 minutes postmortem may be more effective in accelerating postmortem pH decline than continuous stimulation at 1 hour postmortem. Allowing muscles to relax between contractions may allow the chemical energy from glycogen to be used up faster than when the muscle remains contracted.